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Cover: Growing on an otherwise smooth plate, tiny nodules of electrically-deposited copper — each less than 400 millionths of a meter in diameter — form a dazzling "tree". In this issue we present more such vivid images of phenomena in the microcosm, all made with a Canadian-built scanning electron microscope. (Story p. 4). Photograph courtesy SEMCO Instruments Company Limited.

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Recombinant DNA – guidelines Safety first

Recombinant DNA, a technique that allows the mixing of genes from different species, has lately been much on the minds of the public, politicians and scientists. A debate, similar to the one surrounding uranium fission and atomic power plants, has been fuelled by the hypothetical dangers and potential benefits of this powerful tool.

The debate, initiated by American biologists back in 1971, revolved around a crucial question. What are the possibilities of converting harmless bacteria into potentially dangerous ones by inserting new genes into the bacterial chromosome? Could the new form of the bacterium accidentally escape from the laboratory and wreak havoc on mankind?

The town of Cambridge, Massachusets, was an early focal point of the recombinant DNA controversy. Harvard University wanted to build a special facility for conducting recombinant DNA experiments, but the local politicians, concerned about the safety of these experiments, set up a committee of lay people to study the pros and cons of the issue. Scientists, considered a vested-interest group, were excluded. After several months of briefings and discussions, the committee decided that recombinant DNA experiments were no more dangerous than many of the ongoing experiments and, if conducted with reasonable precautions, the threat to humans and the environment would be eliminated.

In America, while the legislative bodies were hammering out recombinant DNA guidelines, experiments were already being conducted across the country. In fact, it was the result of this research which proved that experiments done in proper containment facilities using suitably "crippled" bacteria (organisms incapable of surviving outside the laboratory) did not pose any real threat. Here in Canada, however, this type of research was not being done, and the Canadian science community followed the American developments closely in seeking its own guidelines for recombinant DNA research.

The Medical Research Council of Canada (a government funding agency for medically-oriented research) took the initiative of establishing an ad hoc committee to draw up guidelines for all those doing research with MRC funding. Precautions to be taken were detailed in a special report prepared by the committee consisting of MRC's own officers, several scientists from across Canada, a professor of law, and an observer from the National Research Council of Canada. The comprehensive set of guidelines, similar to those proposed by the Americans and the British, was set out to cover all conceivable recombinant DNA experiments. Different containment facilities were recommended according to the potential hazard of the materials used. Specific guidelines were also established for handling the DNA molecules (genes) to be cloned and the vectors which transport them into the bacteria. Finally, recommendations were outlined for inactivation and safe disposal of waste biological materials. These guidelines have been endorsed by the National Research Council and other federal agencies.



Most scientists and informed nonscientists now agree that recombinant DNA research adhering to these guidelines and to common sense would not only be free of risks, but holds the promise for many exciting new developments. The production of pure human hormones, of protein factors required by haemophiliacs for blood clotting, and of non-leguminous plants that can generate their own nitrogen fertilizer, are only a few examples of the endless list of beneficial applications which could derive from this new technique. In fact, it is already being touted as one of the major biomedical discoveries of the century. Sadiq Hasnain